

FRIENDS OF THE PHILIP L. WRIGHT ZOOLOGICAL MUSEUM

FALL 2020 (No. 36)

FROM THE CURATOR

A NEW NORMAL, FOR NOW

The PLWZM hit a couple of big milestones in the last six months! First, we closed out our grant from the National Science Foundation, marking the end of our major renovation phase. While there is much settling-in left to do, we are breathing a sigh of relief and gratitude for the critical improvements made to the museum. Second, we hosted a summer workshop focused on engaging undergraduate students in natural history museums, the first of its type at UM in many years and hopefully a blueprint for future classes and workshops. You can read about both of these projects in the pages following.

Though, of course, there's been no escaping COVID-19 saturation. We're all tired of it! But we have remained conscientious so that our fatigue doesn't turn into complacency. The PLWZM has had two things going for us during the pandemic: the timing of our work is flexible, and most of it can be done individually once properly trained. We've been able to take advantage of those strengths and keep decent momentum on all of our most important projects. But as heartened as I've been to see our students adapt to these challenges, the circumstances make it much harder to build community; I have several students working on the same project who have never met face to face! It's certainly fun to see a shared project magically advance in your absence, but we're all looking forward to the day when we can meet in person to work, talk, and learn together.

Speaking of meeting in person, I look forward to meeting as many of you as possible in the safe future. In the meantime, I'm enjoying connecting with some of you over email to hear about your past experiences in the PLWZM. To that end, I have added a new section to the newsletter called **Museum Memories**, to feature some of your photos and stories each issue. If you have something that stands out in your memory, please send it along to share with everyone!

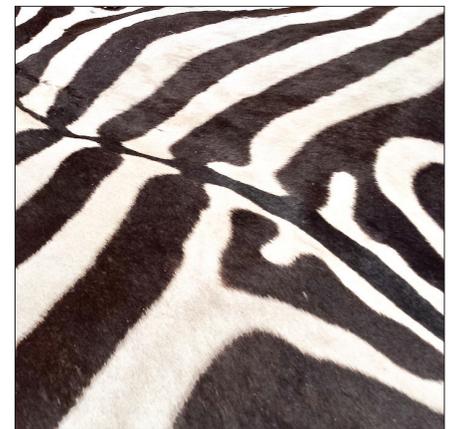


Stay well,

Angela Hornsby, Ph.D.
PLWZM Curator



ABOVE: Volunteer Kyle Peterson sorts through large skulls and skeletons, checking the catalog numbers against our database and tagging anything that isn't yet labeled with its collection information. This is part of our ongoing process to migrate specimens into the new ungulate storage room.



RIGHT: One of our zebra pelts laid out for inspection during an inventory.

2020 BY THE NUMBERS

Specimens prepared	81
Research loans & data requests / specimens	5 / 349
Education loans / specimens	8 / 44
Outreach loans / specimens	6 / 17
Interns & independent study / hours	4 / 391
Volunteers / hours	13 / 316
Tours / participants	6 / 78

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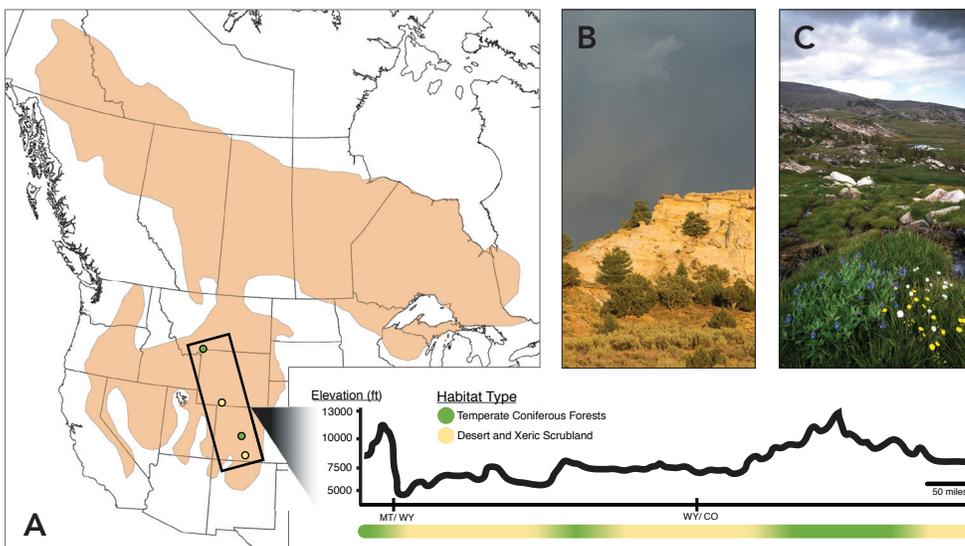


EVOLUTIONARY DYNAMICS OF ADAPTATION

Nathanael Herrera
OBEE Ph.D. candidate, Good Lab
PLWZM Graduate Curatorial Assistant

Theodosius Dobzhansky, one of the most influential geneticists of the last century, aptly stated, **“Nothing in biology makes sense except in the light of evolution.”** Evolution is the conceptual foundation for understanding how life on Earth diversified. A central driver of biological diversity is adaptation to new or changing environments, crucial to the long-term persistence of most species. Yet, we lack a clear understanding of the ecological and genetic factors that contribute to local adaptation, especially within broad-ranging species occupying a diverse array of environments. My dissertation aims to understand the ecological and genetic basis of local adaptation within a charismatic rodent, the least chipmunk (*Tamias minimus*, Fig. 1).

But don't let the name fool you! It's not the least of the chipmunks, just the smallest in size. In fact, least chipmunks are the most broadly distributed chipmunk species and are what ecologists call a generalist; they inhabit a broad range of habitats ranging from arid sage scrub up to the sub-alpine/alpine zone across western North America (Fig. 2). However, throughout its range, it is often competitively excluded by other forest dwelling chipmunk species when they co-occur. **Being excluded from montane forests results in the least chipmunk persisting—and adapting—to both higher elevation montane/alpine habitats and lower elevation semi-arid sagebrush scrub habitats.** But how can we use this species to study adaptation? We can compare populations of least chipmunks from contrasting environments. For example, least chipmunks from alpine habitats tend to be much larger in body size and have dark pelage coloration, whereas those found in desert sage scrub are smaller and have a very light tan pelage coloration (Fig. 1).



and more importantly our appreciation, for the utility and importance of natural history collections. **With the myriad of emerging threats to biodiversity and the unprecedented pace at which it is being lost, the value held within natural history museums has never been greater.**

Fig. 2 | Geographic distribution and population sampling in least chipmunks across an ecological gradient. (A) Geographic distribution of least chipmunks. Colored dots indicate sampled localities and are color-coded by habitat type. Color gradient shows habitat associated with elevation across the transect. (B) Example of sage scrub habitat at one of my field collecting localities in Wyoming. (C) Example of high elevation alpine habitat at one of my field collecting localities in Montana.



Fig. 1 | Typical color variation in least chipmunks. The lighter individual on the top is from lower elevation / sage scrub habitat, and the darker individual on the bottom is from higher elevation / subalpine habitat.

To better understand how least chipmunks adapt across different habitat types, I am leveraging modern genomic approaches to dissect the genetic basis of local adaptation; I want to understand which traits contribute to adaptation as well as the genes that underlie those traits. **My research relies heavily on the invaluable material in natural history museums like the PLWZM.** These museums allowed me to leverage more than one hundred existing specimens, in addition to new field-collected specimens, to study paired replicate populations across elevation and ecology (Fig. 2).

To quantify differences, I have collected basic information such as body size and habitat associations, and used more rigorous approaches such as spectrophotometry to measure variation in pelage coloration. Even more exciting is how recent advancements in next-generation sequencing technologies allow us to sequence whole genomes from small snippets of museum skins, opening the floodgates for understanding the evolutionary history of biodiversity and how populations, both modern and historic, respond to environmental change. My hope is that my research will address fundamental questions about the process of adaptation and the evolution of adaptive traits. I think this work provides a unique opportunity to understand how species and populations across contrasting environments might respond to environmental change. This is important because the likelihood of persisting into the future will greatly depend on the adaptive capacity of a species. Lastly, I hope my work contributes to our understanding,

COMPACTORS: THE HEAVY LIFTERS OF SPECIMEN STORAGE

In a museum far, far away... or perhaps actually very close to you... is a storage solution that draws not infrequent comparisons to the garbage compactor from Star Wars Episode IV. But rather than compacting trash, we are squeezing the most out of the square footage in our archival room by compacting the research collections.



ABOVE LEFT: An open walkway between compactor bays.

ABOVE RIGHT: Ground-level laser sensors stop compaction if there is anything in the walkway between closing bays.

The most important purchase from our National Science Foundation grant was our new Viking cabinets from Spacesaver, designed specifically for use in natural history museums. Though simple, these cabinets offer two critical features: all-steel construction to avoid off-gassing of volatile compounds from wood and adhesives, and fully sealed doors to reduce the risk of insect pests. The 82 cabinets in the research collections are mounted onto 10 bays, 8 of which are mobile and slide along metal tracks in the floor. With only one walkway between bays open at a time, we can fit about twice as many specimens into this room as we'd be able to without compaction. Even better, the compactor is electronic, which makes the collections more accessible, saves a surprising amount of time by allowing us to move all the bays at once, and provides a smoother ride for the specimens than a hand-crank system. And of course, it's all held in climate-controlled conditions to reduce the potential for heat and moisture damage.

It's a genuinely state-of-the-art facility, and we are thrilled to have it as the heart of the museum.



ABOVE: Two drawer sizes, optional middle posts, and tracks spaced every inch allow customization to perfectly fit specimens large and small.

CARCASS CLUB

What do you do when you have a backlog of specimens in the freezers awaiting preparation? Enlist the help of a few dedicated students, and make a friendly competition out of it—and so, Carcass Club was born! This group meets on Fridays to prepare specimens for research, education, and outreach depending on the condition and data quality of each animal. Students reach higher Carcass Club levels by preparing more specimens, and are rewarded with prizes and, of course, bragging rights! Though everyone keeps a sidelong glance at the leaderboard, it's always a group effort to share knowledge and tips, help each other with tricky critters, tag-team steps of the preparation, and have fun maximizing the potential uses of each specimen.



ABOVE: Carcass Club regulars (L-R) Erin, Dennin, Madeline, and Samantha, in their natural habitat.

RIGHT: The level 1 Carcass Club prize, earned by preparing five specimens, is a sticker designed by Graduate Curatorial Assistant Erin Keller.



CARCASS CLUB LEADERBOARD

September 2020 – November 2020

Preparator	Tally	Level	Known for
Samantha Getty	21	2	bat love
Erin Keller	8	1	bird knowledge
Madeline Kleeman	6	1	speed skinning
Dennin Holmes-Mora	4		meticulousness
Autumn Evans	1		porcupine skills
Isabel Rickert	1		clean stitching

RIGHT: A colorful male lazuli bunting (*Passerina amoena*). Carcass Club students learn to prepare medium passerines or rodents before advancing to more challenging larger or smaller specimens like this.



MONTANA NATURAL HISTORY WORKSHOP

As our National Science Foundation grant was coming to a close in August, we focused on one of our final goals from that award: to increase student participation in the PLWZM. While we had several options for what that could look like, we were excited about a workshop that would allow us not only to offer a unique experience for students, but also to dry-run a format and some content that could serve as a guide for future classes and events. And so, we planned within COVID-19 restrictions to make the summer 2020 Montana Natural History Workshop happen!

This 10-day, 10-student workshop was open to applicants across the Montana University System, and was designed around two broad themes: (1) the natural history of Montana, and (2) the role of natural history museums in building our scientific understanding of the world. The larger goal spanning these themes was to overtly connect something the students are familiar with—biodiversity or natural history information like you would find in a field guide or learn about in a class—with the **specimens, work, and types of institutions** that helped to develop that knowledge through time.

The workshop involved nine instructors, three museums, and eight field sites, including units on mammal and bird preparation with Graduate Curatorial Assistants **Erin Keller** and **Nathanael Herrera** in the PLWZM, herbarium specimen collection and preparation with **Andrea Pipp** of the Montana Natural Heritage Program, geological and paleontological specimen curation with **Kallie Moore** in the UM Paleontology Center, tours of the UM anthropological and archaeological research collections with Ph.D. student **Haley O'Brien**, discussion of long-term research at the UM Flathead Lake Biological Station with director **Tom Bansak**, and several days of instruction with **Christine Morris** and **Ser Anderson** from the Montana Natural History Center, through which the workshop participants earned their Montana Master Naturalist Certification. (Phew!) And to cap off the experience, each participant had time to work on a “special project” of their choosing—we had one wild afternoon where students were skinning a robin, photographing specimens, rehousing ungulate skeletons, pressing specimens for a plant guide, fleshing a bobcat pelt, skeletonizing bats, and more!



ABOVE: Workshop students at the end of day 10! Back L-R: Hunter Wiggins, Michaela Shifley, Katherine Wendeln, Abram Brown, Jillian Downey, Erin Keller, Autumn Evans. Front L-R: Maja Holmquist, Sydney Driver, Samantha Getty, and PLWZM Curator Angela Hornsby. Masks be darned, we are all smiling!



ABOVE: Birding with MNHC on workshop day 7.

BELOW: Autumn Evans begins skinning a porcupine for her special project on workshop day 5.



From the student perspective, we had three major hopes. First, that they would experience things outside of their usual curriculum. Second, that they would leave with an appreciation of the role of natural history museums in our understanding of the world. And third, that they would enjoy learning about these new topics and maybe even stay engaged with a museum. Based on their feedback, and the fact that several workshop students have continued to volunteer in the PLWZM, we feel confident that we had some good success! In their own words:

I really enjoyed the workshop and learned a lot about a topic that I hadn't previously had the chance to be exposed to. I would love to volunteer in the future!

I really enjoyed this workshop and felt like it really enhanced my professional development. ... Overall, this workshop was very informative, well-run, and engaging. I would recommend it to other students in my department.

So glad I applied! I've only had a handful of experiences that have heavily influenced my life, and I definitely believe this is one of them. ... It was great to learn the process of collecting data for specimens so they are useful from a research standpoint.

It was fun to experience so many new and interesting things in a field that is parallel to mine, but I knew nothing about.

I LOVED this workshop!!! I am already telling everyone I know about it. ... I would love to help with similar workshops or even take this workshop again!

SHARE YOUR MEMORIES WITH US!

Do you have any photos or stories from your time in or around the PLWZM? We want to hear from you!

We're working to accumulate some oral, written, and media history of the PLWZM—memories about staff, students, field work, classes, events, projects, specimens, or just day-to-day happenings in the museum. Whether it's funny or poignant, remarkable or ordinary, from last year or decades ago, we'd love to hear it all. **We'll fit as much as we can into the Museum Memories section of future newsletters, and all contributions will become part of the historical record for future generations to hear about life and work in the PLWZM in earlier years.** You can submit memories by postal mail or email; see the last page of this newsletter for contact information.

BELOW: This issue's Museum Memory is a classic! This photo of Phil Wright was taken around 1965 by **Mike Kinsella**, who was a Masters student at UM. The occasion was the grand opening of the Health Sciences building, and Phil is standing by his display on delayed implantation in mustelids in HS 211, an office room next to the old bird and mammal collections room HS 212 (our current-day classroom). This is the picture of Phil that we use most often on posters, our website, and other materials.



Photo: Mike Kinsella, circa 1965



ABOVE: Close-up of yellow-bellied marmot fur (*Marmota flaviventris*).

BACKROOM NOTES

WHAT'S IN AN ACRONYM?

I'll admit it: I am a top offender in constantly switching between acronyms in reference to our collections. Officially the Philip L. Wright Zoological Museum—named of course to honor the foundational contributions of our eponym—our acronym is naturally PLWZM. That's what most people know the museum as, and why you are the Friends of the PLWZM! But if you catch me in conversation, I'm likely to call our museum the UMZM, as in the University of Montana Zoological Museum. Why is that?

For me, the acronym UMZM comes to mind quickly because I work with it day-to-day in our database system. UMZM is our official **institution code** in the GBIF Global Registry of Scientific Collections, and it's therefore the prefix in the **globally unique identifier** for each of our specimens (for example, UMZM:Mamm:1234). The registry regulates the acronyms used in shared public databases, ensuring that even though dozens of museums will have a mammal specimen with catalog number 1234, those specimens won't be confused since we all use different institution codes. There will never be another UMZM!

Why did we register as UMZM instead of PLWZM? The former is an older acronym; as the museum was dedicated in Phil Wright's memory fairly recently (1997), it made sense to continue using UMZM as far as our publically available database is concerned. Such consistency makes it easier for researchers to attribute specimens used in their research to the correct museum(s), and easier to find specimens cited in past work. Though online databases have reduced some of the potential for confusion, I am still occasionally bested by an acronym that seems to be an old institution code that's been cycled out of use.

As Kallie Moore of the UM Paleontology Center pointed out to me recently, our Missoula campus was known at times as the State University of Montana (1913-1935) and Montana State University (1935-1965), so we are likely to find many different acronyms historically used to reference our collections... UM, UMZ, UMZM, UMVM, MSU, MSUZ, MSUZM, etc. But as long as we continue calling our collections UMZM in the public databases, we can make things less confusing going forward. -AH



ABOVE: Independent study student Sydney Driver works on one of her displays in a series of cabinets on the 5th floor of the Mansfield Library.

WHO'S IN THE MUSEUM

GRAD STUDENTS: Graduate Curatorial Assistant **Erin Keller** helped lead Carcass Club each Friday in the prep lab—she was most recently seen skinning a ruby-throated hummingbird! **Nathanael Herrera** started setting up our new photography system, and **Hila Tzipora Chase** continued work on an update to our display case on the 2nd floor of Health Sciences.

UNDERGRAD INTERNS: **Sydney Driver**, a participant from our summer workshop, returned for an independent study focused on revamping our display cases on the 5th floor of the Mansfield Library. Updated photos to come!

UNDERGRAD VOLUNTEERS: With the need to socially distance this fall, we have carefully spread undergraduate volunteers out across rooms and days. **Samantha Getty** continues to be a PLWZM volunteer extraordinaire, tackling georeferencing over the summer and specimen prep, skeleton cleaning, skull tagging, pelt room inventory, and loan and data requests during the fall. **Madeline Kleeman**, **Dennin Holmes-Mora**, and **Isabel Rickert** joined Carcass Club to prepare specimens, while **Marissa Italiano** and **Kyle Peterson** dug into the task of getting all of our large skulls tagged with their collection information.

FRIENDS & VISITORS: As you would expect, we had few visitors in the museum over the last six months. Summer workshop participant **Autumn Evans**, a student at Montana State University, made a special trip to Missoula to join Carcass Club and tackle preparation of a beautiful gyrfalcon. **Larry DePute** has continued working on bird skeleton articulations, sneaking in when the prep lab is quiet to complete a pileated woodpecker skeleton, mount a full wing spread of a great horned owl for Sydney's displays, and start degreasing and sorting a sage grouse. When the museum was otherwise empty, we welcomed three small tour groups from the **Missoula Parks & Recreation** day-camp program.

MISCELLANY

Did you miss our recent **video tour of the PLWZM**? You can see it on our website, or on YouTube by searching for "Tour of the Philip L. Wright Zoological Museum."

Among our recent accessions is a collection of skulls from UM alumnus and retired wildlife biologist **Dave Shea**. The skulls are in remarkably good condition considering that Dave used them in classes for many years! They will be a wonderful contribution to the PLWZM research and teaching collections.

It was a win-win situation when we ran out of space for our shoulder and antler mounts just as **Dr. Josh Millspaugh**, UM Boone and Crockett Professor of Wildlife Conservation, was renovating his lab group's office space in the Forestry building. Many of our mounts are now on display there, rather than packed away in a backroom!

Happy upcoming 85th anniversary to the **UM Wildlife Biology Program**! The PLWZM has a long history with this nationally recognized program—not least of which being that it was started in part by Phil Wright. Our strong ties continue as the PLWZM supports popular wildlife courses and welcomes wildlife experiential interns each semester.

FROM THE DIRECTOR

LOOKING FORWARD TO 2021 WITH EXCITEMENT AND OPTIMISM

Hello Friends,

2020 was a remarkable year at the PLWZM. I am thrilled to announce the complete renovation and expansion of our collection! This ambitious 5-yr project was initiated under the leadership of retired Associate Dean **Charlie Janson** and Professor Emeritus **Dan Pletscher**, and has provided the critical infrastructure needed for the PLWZM to continue to serve as Montana's flagship natural history repository for generations to come.

This momentous undertaking was only possible because of **generous support from the Friends of the PLWZM and the National Science Foundation**. I also want to thank our outstanding present (**Dr. Angela Hornsby**) and past (**Dr. Libby Beckman**) curators, as well as numerous faculty, staff, volunteers, and students for all of their hard work. This was truly a community effort. With the PLWZM collections now secured in a state-of-the-art facility, we look forward to a vibrant future.

Thank you!

Jeff Good, Ph.D.
Associate Professor
PLWZM Director





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OUR MISSION

The Philip L. Wright Zoological Museum, a unit of the Division of Biological Sciences of the University of Montana, is committed to the collection and preservation of zoological specimens for the purposes of research, education, and community outreach. We work for both current and future generations, sustaining these irreplaceable resources representing our natural heritage in Montana and beyond.

Return this form to:
Philip L. Wright Zoological Museum
DBS Health Sciences 104
University of Montana
32 Campus Drive
Missoula, MT 59812

You can also donate online at:
<http://hs.umt.edu/umzm/support.php>

All donations are tax deductible to the full extent provided by law.



FRIENDS OF THE PHILIP L. WRIGHT ZOOLOGICAL MUSEUM

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